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Research Article

THERMAL DEGRADATION EFFECT ON THE PROXIMATE ANALYSIS OF NIPA PALM FIBRE

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ABSTRACT

Proximate analysis was carried out on Nipa palm fibre to determine the moisture, ash, nitrogen, cellulose, hemi-cellulose, and lignin content. The fibre was then subjected to thermal degradation at 100°C, 200°C, and 300°C after which a repeat of the proximate analysis was done on the degraded samples in order to determine the effect of degradation on the proximate analysis. The result of the proximate analysis showed that Nipa palm fibre is rich in cellulose which can be bleached to obtain white cellulose used in industries and that it can be stored because of low moisture content. The nitrogen content decreases as the temperature of degradation increases.

Keywords: Nipa palm fibre, Proximate analysis, Content, Percentage yield.

INTRODUCTION

The location of Nigeria within the tropical region favours the luxuriant growth of palm species, both the indigenous and exotic[1]. The country is a natural home for many palms such as Oil palm (*Elaeis guineensis)*, and Palm wine or raffia palm (*Raffia hookeri*). Other palm plants from other lands also grow well in Nigeria. These include Coconut palms (*Cocos nucifera*) and Nipa palm (*Nypa fruiticans).* There are some palms with climbing stems such as the rattan palms. Others do have stems which are found below the ground. A case example of the underground stem is the Nipa palm[2].

Nipa palm is believed to be one of the oldest and previously most extensive palm of the world now found starting from India to Sri-lanka, the Philipines Islands and some other Islands of the pacific[3]. Nipa palm is also found in the Niger-Delta region of Nigeria where it was intended to check erosion. The massive presence of Nipa palms in the coastal ecosystem of Nigeria has contributed to migration of fauna resources to areas they cannot cope with physically and ecologically hence reduction in breeding and reproduction [4,5]. Nipa palm does not absorb pollutants, thus particulates or sediments become a source of micro fauna and flora depletion [6].

Nipa palm which is known to have negative effects can be controlled sensibly[7]. Many common products have been made from Nipa palm [8]. The few ones are listed. The long feathery leaves of Nipa palm are used by local populations as roof material for the thatched houses or dwellings. The leaves are also used for indolence ulcers. Juices of young shoots with coconut milk are used as herbs. Ash of roots and leaves are used for headaches and toothaches. The fermented sap diluted with water is used as eye wash in eyelid and conjunctiva inflammations [9]. The flower cluster (inflorescence) can be trapped before it blooms to yield a sweet, edible sap collected to produce a local beverage called Tuba (TUAK) which also forms vinegar [10].Nipa has a very high sugar-rich sap yield Sugar has been extracted from the nuts of Nipa palm [11]. Report has it that over thirty craft items with materials sourced from Nipa palm have been designed and perfected in Nigeria[6]. In this work proximate analysis were carried out on the husk fibres.

MATERIALS AND METHOD

Nipa palm nuts were collected from the coastal region of Oron, with the help of the staff of the Nipa palm Utilization Project Centre, National Museum, Oron, Akwa Ibom State, Nigeria. The husk fibre were separated from the nuts, sun dried, macerated into tiny particles, then kept for use.

Proximate analysis was carried out on Nipa palm fibre to determine the moisture, ash, nitrogen, cellulose, hemi-cellulose, and lignin content. One gramme of sample was used in determination of the moisture content according to AOAC method [12]. Ash content was determined using 2g of Nipa palm sample according to AOAC method. The method repeated at 100°C, 200°C and 300°C of degradation. One gramme of sample was used in Nitrogen content was determined using Kjeldahl's method[13]. The method was repeated for 100°C, 200°C, and 300°C of degradation. Cellulose, hemi-cellulose, and lignin contents were determined using 40g each by Doree method[14]. This was also repeated for 100°C, 200°C, and 300°C of degradation.

RESULTS AND DISCUSSION

In Table 1 is shown the result of proximate analysis for raw and degraded Nipa palm fibre

Table 1: Result of proximate analysis for raw and degraded Nipa palm fibre

S/N	Constituent	Weight Of Ash (g)	Content (Raw fibre) (%)	Content At 100°C Degradation (%)	Content At 200°C Degradation (%)	Content At 300°C Degradation (%)
1	Moisture content	-	11.00	-	-	-
2	Ash content	0.2	40.00	40	40	40
3	Nitrogen content	-	2.03	1.82	1.04	0.8
4	Cellulose content	3.3	33.00	1.50	0.8	0.5
5	Hemicellulose content	3.1	31.00	9	5	3
6	Lignin content	3.6	36.00	3	2	7

From the result presented in Table 1, it can be seen that the moisture content is within the safe limit of 15% which is essential in food storage [12]. Therefore product emanating from this fibre can be stored like beverages, drinks, etc. The result of the ash content shows that they all have the same ash content. The reason is because they are of the same material so degrading at different temperatures does not really differ in terms of ash, at the end the same amount of product is gotten but at different duration. Therefore it can be deduced that ash consists of only inorganic compounds which are non-combustible. As elements are absorbed with water by the roots,

it then follows that the higher the amount of inorganic elements in plant, the higher the amount of ash obtained when the plant is burnt. From Table 1, the percentage yield of nitrogen, cellulose, and hemi-cellulose contents decreases from the raw fibre to the highest temperature of degradation. It then be deduced that degradation causes loss of the content determined and the more the temperature of degradation the more, the more contents are lost. At the same vein, percentage yield of lignin decreases from raw fibre to the degradation but there was a sharp increase at 300^{o}C temperature of degradation. This may be attributed to the fact that Nipa palm fibres break down more easily at a high temperature thereby causing the fibres to go into solution.

CONCLUSION

From the results of proximate analysis of Nipa palm fibre, it is obvious that Nipa palm fibre should be a very important raw material in our industries. It can be used in industries for the production of drinks and lots of household items. Nipa palm fibre also contains brown cellulose which can be bleached to obtain white cellulose.

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